U.S. Department
of Transportation
**Federal Aviation
Administration**

**Detroit Airports District Office
11677 South Wayne Road
Suite 107
Romulus, MI 48174**

October 3, 2016

Mr. Vince DesJardins
Southwest Michigan Regional Airport
1123 Territorial Road
Benton Harbor, Michigan 49022

Dear Mr. DesJardins:

Southwest Michigan Regional Airport, Benton Harbor, Michigan
Modification of Standards
Base Course

Enclosed is a copy of the conditionally approved Modification of Standards (MOS) for using a recycled bituminous aggregate base course in place of Standard FAA Base Course.

Conditions of approval:

1. Depth of recycling must be included on plans and is to be a fixed depth, not varying – See Comment 1.
2. Sequence must be included on plans – See Comment 2.
3. During test section and any other locations indicated by the Engineer, the Contractor and Engineer must provide visual evidence that the remaining subbase remains 'undisturbed' or in a compacted condition meeting specifications and acceptable to the Engineer.
4. Engineer to verify recycled material meets or is exceeding assumed modulus.

Comments:

1. Recycling is "pulverized" to a fixed depth, not a variable depth (the variable depth of material is after grading); so as to assure complete recycling of asphalt pavement and aggregate base courses, the engineer should determine depth by adding the anticipated thickest pavement/aggregate base section plus 1" – 2" +/- of material below aggregate base (i.e., say for the section with 3 ¾" to 5 ¼" pavement surface over 5" to 6" aggregate base – thickest section would be 11 ¼" so typically would say 12" then plus 2" for the recycle depth of 14"). The example is not a requirement, just indicating how the engineer can develop required 'fixed' recycle depth.
2. Sequence mst be clear and should be kept simple; such as indicating – Recycle existing pavement to a depth xx" – Regrade recycled material to new profile indicated on the plans, leaving minimum 6" (thickness after compaction) – Compact in accordance with specifications – Pave surface 3" P401. The example is not a specific requirement, just indicating how a simple clear sequence could look like on the plans.

If you have any questions, please contact me at 734-229-2956.

Sincerely,

Mary Jagiello

Mary W. Jagiello
Program Manager
Detroit Airports District Office

cc: MDOT Aeronautics

FAA GREAT LAKES REGION
MODIFICATION OF AIRPORT DESIGN STANDARDS
COMPLETE FORM IN CONJUNCTION WITH THE USER GUIDE

BACKGROUND

1. AIRPORT: Southwest Michigan Regional Airport	2. LOCATION (CITY,STATE): Benton Harbor, MI	3. LOC ID: BEH
4. EFFECTED RUNWAY/TAXIWAY: Runway 14-32 and Taxiway A	5. APPROACH (EACH RUNWAY): ___ PIR ___ NPI _X_ VISUAL	6. AIRPORT REF. CODE (ARC): D-II

7. DESIGN AIRCRAFT (EACH RUNWAY/TAXIWAY): Runway 14-32 is B-I (Beech Barron 58) and Taxiway A is D-II (Gulfstream 1V)

MODIFICATION OF STANDARDS

8. TITLE OF STANDARD(S) BEING MODIFIED (CITE REFERENCE DOCUMENT):
150/5320-6E Airport Pavement Design and Evaluation

9. STANDARD/REQUIREMENT:
310. Base Course.

10. DESCRIPTION OF PROPOSED MODIFICATION:
Replace standard FAA base courses with a recycled bituminous aggregate base course. The base course material will be composed of pulverized bituminous pavement and existing base course material.

11. EXPLAIN WHY STANDARD(S) CANNOT BE MET:
The existing base course is of unknown quality and not of sufficient quantity to be a reliable base course and needs to be supplemented or replaced.

12. DISCUSS ALL VIABLE ALTERNATIVES:
The existing base course could be removed and replaced with new P-209 or P-208 aggregate base courses.

13. ASSURANCE THAT MTS WILL PROVIDE AS OUTLINED IN THE 'USER GUIDE':
Gradation and compaction required in the specification has been shown in the FAA Central region to be reliable for producing CBR values higher than what was specified in this project.

A modulus of 30,000 will be used in the design. This equates to a CBR of 20 and a k value of 242.55 pci.

ATTACH ADDITIONAL SHEETS AS NECESSARY – INCLUDE SKETCH/PLAN

FAA GREAT LAKES REGION
MODIFICATION OF AIRPORT DESIGN STANDARDS

14. Skip to Question 15 if request is not for a Modification To Material Standards or Construction Methods.

	CHECK WHEN APPLICABLE
☐	Modifications to materials standards is requested because locally available materials cannot meet the requirements of that standard.
■	Modifications to construction methods standards will result in cost savings and/or greater efficiency.
☐	Bids have already been received for this project.

IF ANY OF THE ABOVE IS CHECKED PLEASE PROVIDE ADDITIONAL DETAILS.

It is anticipated that the use of a recycled bituminous aggregate base course will save $200,000 over the alternatives discussed.

15. SIGNATURE OF ORIGINATOR:	16. PRINTED NAME OF ORIGINATOR	17. DATE
	Vince DesJardins	4/5/16
18. ORIGINATOR'S ORGANIZATION:	19. TELEPHONE	20. E-MAIL
Southwest Michigan Regional Airport	(269) 927-3194	director@swmiairport.com

21. DATE OF LATEST FAA SIGNED ALP:

March 2, 2004

BELOW IS TO BE COMPLETED BY FAA

22. ADO RECOMMENDATION:	23. SIGNATURE:	24. DATE:

25. FAA DIVISIONAL REVIEW (AT, AF, FS, etc.):

ROUTING SYMBOL	SIGNATURE	DATE	CONCUR	NON-CONCUR
AGL-622		07/26/2016	CONCUR WITH COMMENTS	

COMMENTS:

A conservative modulus of 30,000 was applied to the proposed recycled bituminous base course. Their proposal is based on a Central Region Specification, where no more than 50% of the material will be from the recycled bituminous pavement. Region concurs but requests HQ's review.

26. AIRPORTS' DIVISION FINAL ACTION:

☐ UNCONDITIONAL APPROVAL	☒ CONDITIONAL APPROVAL	☐ [redacted]

DATE:	SIGNATURE:	TITLE:
8/26/16	[signature]	Manager ASAS-100

CONDITIONS OF APPROVAL:

1.) Depth of recycling must be included on plans and is to be a fixed depth, not varying ~ See comment 1;

2.) Sequence must be included on plans ~ See comment 2;

3.) During test section and any other locations indicated by the Engineer, the Contractor and Engineer must provide visual evidence that the remaining subbase remains 'undisturbed' or in a compacted condition meeting specifications and acceptable to the Engineer

4.) Engineer to verify recycled material meets or is exceeding assumed modulus.

Comments

1) Recycling is "pulverized" to a fixed depth, not a variable depth (the variable depth of material is after grading); so as to assure complete recycling of asphalt pavement and aggregate base courses, the engineer should determine depth by adding the anticipated thickest pavement/aggregate base section plus 1" – 2"+/- of material below aggregate base (i.e., say for the section with 3 ¾" to 5 ¼" pavement surface over 5" to 6" aggregate base – thickest section would be 11 ¼" so typically would say 12" then plus 2" for the recycle depth of 14"). The example is not a requirement, just indicating how the engineer can develop required 'fixed' recycle depth.

2) Sequence must be clear and should be kept simple; such as indicating - Recycle existing pavement to a depth xx" - Regrade recycled material to new profile indicated on the plans, leaving minimum 6" (thickness after compaction) - Compact in accordance with specifications - Pave surface 3" P401. The example is not a specific requirement, just indicating how a simple clear sequence could look like on the plans.

FAARFIELD v 1.41 - Airport Pavement Design

RUNWAY FAARFIELD REPORT

Section Rwy14-32N in Job BEHRwy14-32.
Working directory is X:\1936900\140817.01\TECH\dsgn\

The structure is New Flexible. Asphalt CDF was not computed.
Design Life = 20 years.
A design for this section was completed on 08/08/16 at 11:15:18.
Minimum layer thicknesses were reached.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R.psi
1	P-401/ P-403 HMA Surface	3.00	200,000	0.35	0
2	User Defined	3.00	30,000	0.35	0
3	Subgrade	0.00	12,000	0.35	0

Total thickness to the top of the subgrade = 6.00 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Aztec-D	5,200	50	0.00
2	Centurion-210	4,100	125	0.00
3	Chk.Six-PA-32	3,400	100	0.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Aztec-D	0.00	0.00	6.14
2	Centurion-210	0.00	0.00	6.61
3	Chk.Six-PA-32	0.00	0.00	6.97

User is responsible for checking frost protection requirements.

FAARFIELD v 1.41 - Airport Pavement Design

Section Rwy14-32S in Job BEHRwy14-32
Working directory is X:\1936900\140817.01\TECH\dsgn\

TAXIWAY FAARFIELD REPORT

The structure is New Flexible. Asphalt CDF was not computed.
Design Life = 20 years.
A design for this section was completed on 08/08/16 at 11:14:55.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Surface	4.00	200,000	0.35	0
2	User Defined	6.00	30,000	0.35	0
3	User Defined	12.87	22,500	0.35	0
4	Subgrade	0.00	12,000	0.35	0

Total thickness to the top of the subgrade = 22.87 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Gulfstream-G-V	90,900	450	0.00
2	Falcon-2000	35,000	100	0.00
3	S-10	10,000	600	0.00

Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Gulfstream-G-V	1.00	1.00	1.69
2	Falcon-2000	0.00	0.00	1.94
3	S-10	0.00	0.00	2.56

User is responsible for checking frost protection requirements.

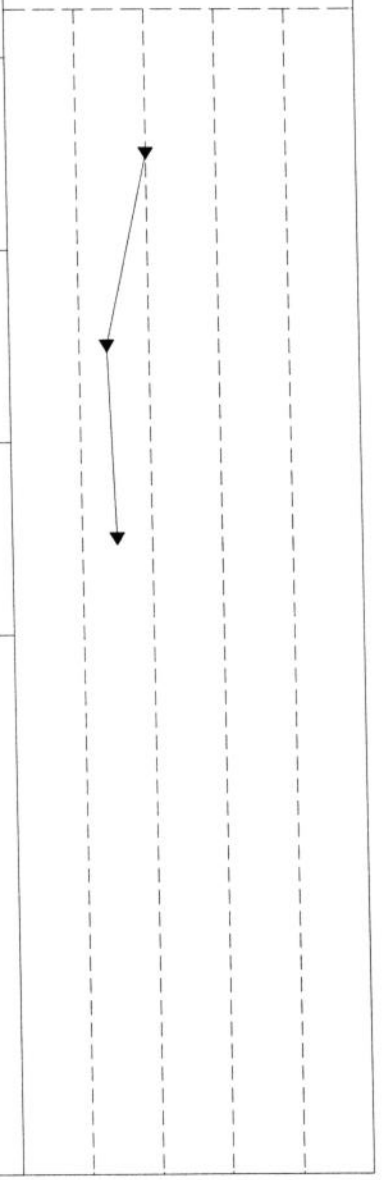
PROJECT NO. 2012117A **DATE** 1/11/2016 **LOG OF TEST BORING** **SB-03**

ELEVATION ft	Depth	DEPTH (ft)	SAMPLE NO.	NO. OF BLOWS FOR 6-inch DRIVE	N VALUE	SAMPLE TIP DEPTH (ft)	UNCONFINED COMP STRENGTH (psf)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	LIQUID LIMIT	PLASTICITY INDEX	% PASSING #200
	Ground Surface Elevation 629.68 ft	0										
629.4	4 inches of ASPHALTIC CEMENT CONCRETE	0.3										
628.9	6 inches of crushed aggregate FILL (Base Material) (Noted to be frozen)	0.8										
628.4	FILL - Silty fine sand, trace clay and gravel, dark brown to black, moist (SM)	1.3	SS1	26-10-10-7	20	2.5						
	FILL - Medium dense silty fine sand, trace clay, mixed dark brown and brown, moist (SM)		SS2	6-6-8-8	14	4.5						
625.2		4.5										
	Medium dense FINE SAND, trace to some silt, brown, moist (SP-SM)	5	SS3	5-8-7-8	15	6.5						
623.2		6.5										
	End of Boring at 6.5 ft.	10										

▼ SPT N VALUE ▼ 10 20 30 40

● MOISTURE CONTENT (%) ● 10 20 30 40

■ UCC STRENGTH (psf) ■ 2000 4000 6000 8000



BORING COORDINATES
E(x) Coordinate 12564960.0
N(y) Coordinate 235328.0

GROUNDWATER READINGS
First Encountered: none
Upon Completion: none
Remarks:

Drilling Company: West Michigan Drilling
Drill Rig: CME-550X
Engineer on Rig: LM
Drilling Method: 2 1/4 inch HSA
Hammer Type: Auto
Backfilled With: Cuttings/Core/Patch
Date Started: 01-11-16
Date Completed: 01-11-16
Checked By: JDH

Torvane
* Pocket Penetrometer
<> Disturbed Sample

Southwest Regional Airport Runway 14/34 Rehabilitation
Benton Harbor, Michigan

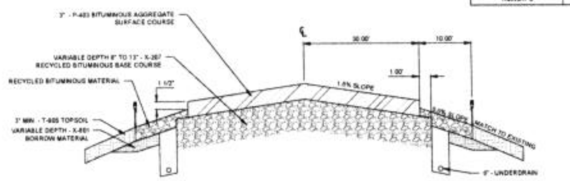
PROJECT NO. 2012117A **BORING NO.** SB-03 **PAGE 1 of 1**

2/9/16

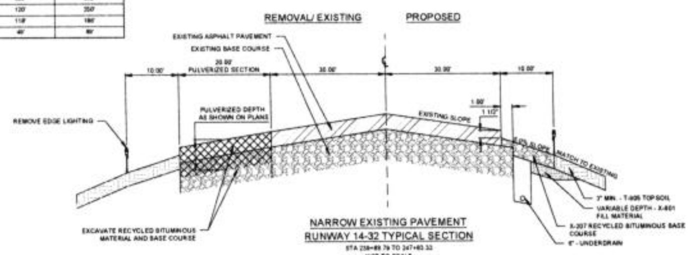
LOG OF TEST BORING 2012117A - LOGS.GPJ SOMAT.GDT 2/9/16

SAFETY AREA DIMENSIONS

	RSA/TSA	OFA
RUNWAY 10-28	500'	800'
RUNWAY 14-32	120'	250'
TAXIWAY A	118'	186'
TAXIWAY D	49'	89'



PROPOSED NORTH RUNWAY 14-32
TYPICAL SECTION
STA 220+00.00 TO 239+89.79
NOT TO SCALE



NARROW EXISTING PAVEMENT
RUNWAY 14-32 TYPICAL SECTION
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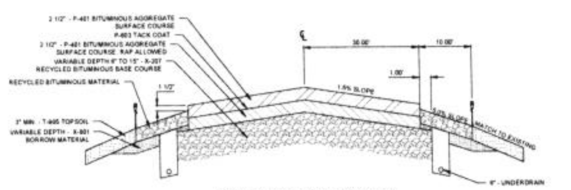
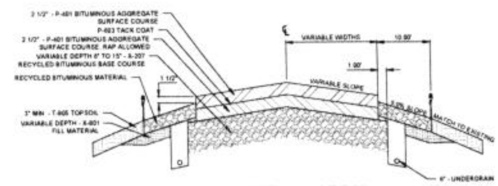
NOT TO SCALE



PROPOSED SOUTH RUNWAY 14-32
TYPICAL SECTION
STA 247+63.33 TO 252+05.00
NOT TO SCALE



PROPOSED TAXIWAY A TYPICAL SECTION
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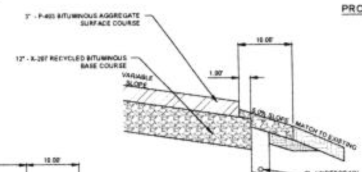
NOT TO SCALE



PROPOSED RUNWAY 14-32 TURN AROUND EXPANSION TYPICAL SECTION
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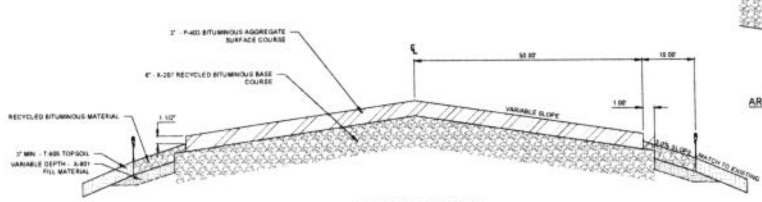
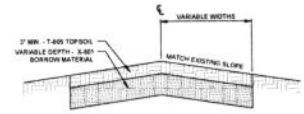
NOT TO SCALE



PROPOSED TAXIWAY D
REHABILITATION TYPICAL SECTION
STA 322+50.00 TO 323+94.49
NOT TO SCALE



REMOVED RUNWAY 14-32 AND
TAXIWAY D TYPICAL SECTION
NOT TO SCALE

NOTE

SECTIONS SHOWN ARE REPRESENTATIVE OF "TYPICAL" WIDTHS AND GRADES BETWEEN THE STATIONS NOTED. SLOPES AND WIDTHS MAY NOT MATCH SECTIONS AS SHOWN FOR EVERY STATION. SEE CS SERIES SHEETS AND CG SERIES SHEETS FOR EXACT GEOMETRY AND GRADING.

Mead & Hunt
2605 Port Lansing Road
Lansing, MI 48906
phone: 517-321-8334
meadhunt.com

SOUTHWEST MICHIGAN REGIONAL AIRPORT
RUNWAY 14/32 REHABILITATION
1123 TERRITORIAL ROAD
BENTON HARBOR, MICHIGAN 49022

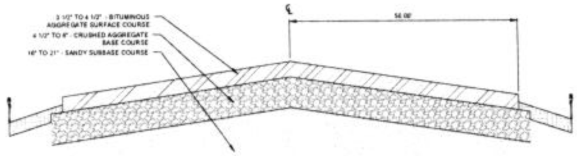
1 05/27/16 ISSUED FOR BID

B-26-0012-5116
104809-140817.01
MAY 27, 2016
SCT
CTD
SCT

TYPICAL SECTIONS

12 of 51

C-301



EXISTING NORTH RUNWAY 14-32
TYPICAL SECTION
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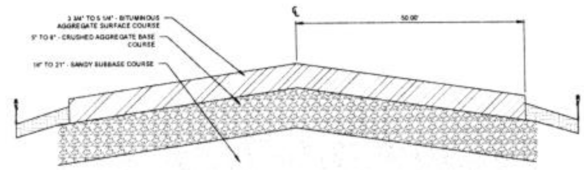

EXISTING SOUTH RUNWAY 14-32
TYPICAL SECTION
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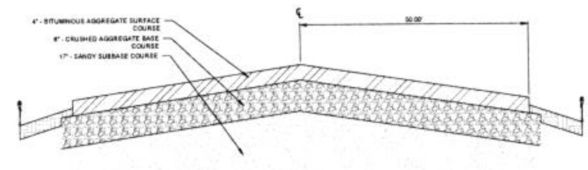
NOT TO SCALE



EXISTING TAXIWAY D
REHABILITATION TYPICAL SECTION
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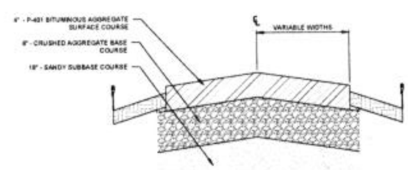

EXISITNG TAXIWAY A TYPICAL SECTION
STA 129+87.12 TO 134+71.32
NOT TO SCALE

NOTE

SECTIONS SHOWN ARE REPRESENTATIVE OF "TYPICAL" WIDTHS AND GRADES BETWEEN THE STATIONS NOTED. SLOPED AND WIDTHS MAY NOT MATCH SECTIONS AS SHOWN FOR EVERY STATION. SEE CS SERIES SHEETS AND CG SERIES SHEETS FOR EXACT GEOMETRY AND GRADING.

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1936900-140817.01
MAY 27, 2016
SCT
SCT
SCT

TYPICAL SECTIONS

12A of 51

C-302

ITEM P-207 RECYCLED BITUMINOUS AGGREGATE BASE COURSE

DESCRIPTION

207-1.1 This item consists of a base course composed of recycled bituminous pavement and existing aggregate base constructed on an existing subgrade in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

MATERIALS

207-2.1 AGGREGATE. The aggregate shall consist of materials produced by recycling operations on the existing bituminous pavement, aggregate base and subgrade. The Contractor will use the aggregate produced by the recycling operation, with the exception that in no case will material larger than 2" in any dimension be permitted to be used in the aggregate base, and no more than 50% of the material can be from the recycled bituminous pavement. All material over 2" shall be removed by the Contractor. The material will be sampled and tested by the Contractor after processing to determine the density and moisture requirements for placing and compaction of the recycled aggregate base material. See Table 1 Gradation Requirements

Table 1. GRADATION REQUIREMENTS

Sieve Designation	Percentage by weight passing sieves
	2" maximum
2 inch (50.0 mm)	100
1-1/2 inch (37.0 mm)	70-100
1 inch (25.0 mm)	55-85
3/4 inch (13.0 mm)	50-80
No. 4 (4.75 mm)	30-60
No. 40 (0.45 mm)	10-30
No. 200 (0.075 mm)	5-15

207-2.2 PRODUCT CONTROL. The Contractor shall handle the material in such a manner that the following requirements shall be maintained:

a. Deleterious Substances. Materials for aggregate base shall be kept free from weeds, sticks, grass, roots and other undesirable foreign matter.
b. Uniformity of Mix. The materials shall be thoroughly mixed by the Contractor in such a manner as to ensure that the final product has a uniform gradation.
c. Stockpiling. The equipment and methods used for stockpiling aggregates and for removing the aggregates from the stockpiles shall be such that no detrimental degradation or segregation of the aggregate will result, no appreciable amount of foreign material will be incorporated into the aggregate and no intermingling of the stockpiled material will occur.

207-2.3 FLY-ASH. Fly-ash shall meet ASTM Specification C-618, section 3.3 when sampled and tested in accordance with Sections 5, 6, and 8 unless otherwise shown on the plans. Fly ash shall be Class C containing a minimum of 25% CaO. The source of the fly ash shall be identified and approved in advance of stabilization operations in order that laboratory tests can be completed.

Fly ash shall be stored and handled in closed weatherproof containers until immediately before distribution. Temporary storage (less than 12 hours) of fly ash in pits may be allowed provided that wetting of the fly ash by rain or ground water is not allowed. Fly ash exposed to moisture prior to mixing with aggregate mixture shall be discarded.

207-2.4 WATER. Water used for mixing and/or curing shall be clean and fee of oil, salt, acid, alkali, sugar, vegetable or other substances injurious to the finished product. Water shall be tested in accordance with and shall meet the suggested requirements of AASHTO T26. Water known to be of potable quality may be used without testing.

CONSTRUCTION METHODS

207-3.1 MIXING. The remaining bituminous pavement and existing aggregate base shall be uniformly blended with recycler to a minimum depth of 8 inches below the milled or existing surface. No more than 50% of the finished product should come from the recycled bituminous pavement.

207-3.2 PLACING. The recycled aggregate base course material shall be constructed in place with additional material from outside of the proposed pavement section.

The maximum depth of a compacted layer shall be 12 inches. If the total depth of the compacted material is more than 12 inches, it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal depth layers. Prior to placing the next layer the, previously constructed layer shall be cleaned of loose and foreign material prior to placing the next layer.

207-3.3 COMPACTION. Immediately upon completion of the spreading operations, the recycled aggregate shall be thoroughly compacted. The number, type and weight of rollers shall be sufficient to compact the material to 100% of density as determined by Michigan modified T180.

207-3.3.1 Proof Rolling Compacted base course shall be proof rolled with a Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 80 psi in the presence of the Engineer. Soft areas of subgrade that deflect > 1" or show permanent deformation > 1" shall be removed and reworked.

207-3.4 ACCEPTANCE. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day' production not to exceed 3000 square yards. A lot will consist of one half day's production where a day's production is expected to consist of 3000 to 4000 square yards.

Each lot shall be divided into four equal sub-lots. Two tests shall be made for each sub-lot. Sampling locations will be determined by the Engineer on a random basis in accordance with ASTM D 3665.

Each lot will be accepted for density when the field density is at least 100% of the maximum density of infield specimens prepared from samples of the base course material in accordance with Michigan modified T180.

When nuclear gages are to be used for density determination, testing shall be in accordance with Section 120.

207-3.5 FINISHING. The surface of the aggregate base course shall be finished by blading or with automated equipment designed for this purpose.

In no case will the addition of thin layers of materials be added to meet grade. If the top layer is ½" or more below grade the top layer shall be scarified to a depth of at least 3 inches, new material added, and the layer blended and re-compacted to bring it to grade.

207-3.6 SURFACE TOLERANCES. The finished surface shall not vary more than 3/8" when tested with a 16-foot straightedge applied parallel with or at right angles to the centerline. Any deviation in excess of this amount shall be corrected.

207-3.7 THICKNESS CONTROL. The completed thickness of the base course shall be within ½ inch of the design thickness. Four determinations of thickness shall be made for each lot of material placed. Sampling locations will be determined by the Engineer on a random basis in accordance with ASTM D 3665. Where the thickness is deficient by more than ½ inch, the Contractor shall correct by excavating at least 3 inches and replacing with new material.

207-3.8 MAINTENANCE. The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed sections of base course, provided that no damage results and provided that equipment is routed over the full width of the completed base course.

207-3.9 WEATHER LIMITATIONS. The fly ash treated recycled bituminous aggregate base course shall not be mixed while the atmospheric temperature is below 40° F or when conditions indicate that the temperature may fall below 40° F within 24 hours, when it is foggy, rainy or when the soil or subgrade is frozen.

METHOD OF MEASUREMENT

207-4.1 The quantity of recycled aggregate base course to be paid for will be determined by measuring the number of square yards of material recycled, constructed and accepted by the Engineer as being in compliance with plans and specifications.

BASIS OF PAYMENT

207-5.1 Payment shall be made at the contract unit price per square yard for recycling the existing bituminous pavement and aggregate base course, spreading, grading, and compacting the recycled material to the grades as indicated on the drawings. This price includes all of the necessary handling to move the material to the areas for spreading and compacting, this may include moving material from outside of the pavement section. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools and incidentals to complete the item. Payment will be made under:

Item 207001	Recycled Bituminous Aggregate Base Course –per square yard
Item 207002	Fine Grade & Compact Recycled Bituminous Base Course-per square yard
Item 207003	Remove and Stockpile Recycled Bituminous Base Course-per square yard

TESTING REQUIREMENTS

ASTM C 29	Unit Weight of Aggregate
ASTM C88	Soundness of Aggregates by Use of Sodium or Magnesium Sulfate
ASTM C 117	Materials finer than 75um(no 200) Sieve in Mineral Aggregate by Washing
ASTM C131	Resistance to abrasion of Small Size Coarse Aggregate by Use of Los Angeles Machine
ASTM C136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM D75	Sampling Aggregate
ASTM D698	Moisture Density Relations of Soils and Aggregate using 5.5 lb Rammer and 12 in drop
ASTM D1556 Method	Test Method for Density and Unit Weight of Soil in Place by the Sand Cone
ASTM D1557	Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

ASTM D2167	Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth)

Intentionally Left Blank